

NON-PUBLIC?: N
ACCESSION #: 9008130286
LICENSEE EVENT REPORT (LER)

FACILITY NAME: South Texas, Unit 1 PAGE: 1 OF 4

DOCKET NUMBER: 05000498

TITLE: Reactor Trip on June 28, 1990 Due to a Electrohydraulic Control
System Line Rupture
EVENT DATE: 06/28/90 LER #: 90-015-00 REPORT DATE: 07/30/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 076

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Scott Head - Supervising Licensing TELEPHONE: (512) 972-7136
Engineer

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

At 0554 hours on June 28, 1990 with Unit 1 in Mode 1 at 76 percent power a reactor trip occurred due to a turbine trip which was caused by low electrohydraulic control (EHC) system fluid pressure. The plant was brought to a stable condition in Mode 3. The cause of this event was failure of an EHC supply line to a main turbine generator throttle valve. The line failed due to excessive vibration induced by oscillation in a main turbine generator governor valve. The oscillations were caused by a loose connection in the control circuit. Investigation revealed that the EHC System piping contained a number of less than adequate supports and that portions of the piping had less than the specified wall thickness. Corrective actions include repairing the loose connection and replacing the less than adequate piping and supports.

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END OF ABSTRACT

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DESCRIPTION OF EVENT:

At 0554 hours on June 28, 1990 with Unit 1 in Mode 1 at 76 percent power a reactor trip occurred due to a turbine trip caused by low electrohydraulic control (EHC) system pressure as a result of a failure in the EHC piping. A main feedwater isolation occurred on low Reactor Coolant System (RCS) average temperature and the auxiliary feedwater system was actuated on low-low steam generator levels. No other ESF actuations occurred during this event. The Main Steam Isolation Valves (MSIV) were manually closed to limit the cooldown. Manual control was used to lower RCS pressure from 2291 psig to 2250 psig due to an apparent sluggish response of the pressurizer pressure controller. All other systems responded as expected and operations personnel stabilized the plant. The NRC was notified of the Reactor Trip at 0654 hours.

Prior to the reactor trip power oscillations of up to 50 megawatts were experienced. These oscillations were determined to be caused by cycling of governor valve #1 (GV-1). The valve oscillations caused rapid vibratory movement of the EHC piping attached to the governor valves and throttle valves. The cycling was severe enough that the EHC piping sheared at a support clamp located next to throttle valve TV-3.

The post trip investigation of the GV-1 actuator revealed a loose wire on the secondary connection of the Linear Variable Differential Transformer (LVDT) in which the screw at the terminal connection was found to be four turns loose. The LVDT provides feedback position to the valve controller. It is concluded that the loose connection could have caused a variable voltage output to the valve controller resulting in the erratic behavior of the valve.

The support clamp at which the pipe failed was the clamp nearest to the TV-3. It was clamped without any rubber or flexible grommet or insulating material, hard against the pipe, and acted as a stress inducing site for the failure. Westinghouse had previously identified, in October, 1983, that the EHC tubing should be clamped with a special design which included a grommet. The clamp style was incorporated into the drawings used to erect the turbines, and all the EHC tubing clamps comply with the design except the first clamp off the valve for each valve. A metal to metal clamp was used on Unit 1 and a U-bolt was used on Unit 2. A previous EHC piping failure on Unit 2, due to cyclic stress on a weld joint, had resulted in addition of more supports in Unit 2. In

the process the U-bolts were removed and all new supports added to Unit 2 were in accordance with the design specified by Westinghouse. At the time of the Unit 2 failure, no vibration problems existed on Unit 1. The EHC piping and supports were inspected on Unit 1 but the focus of these inspections centered more on support location. As such, the inspections would not have revealed the presence of inadequate supports.

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DESCRIPTION OF EVENT Cont'd.:

During replacement of the EHC piping it was discovered that the wall thickness of the failed piping did not meet specifications. It was determined that other EHC lines on Unit I met specifications except for three runs of piping. The piping wall thickness for these runs was found to be 60 percent of the specified value.

CAUSE OF EVENT:

The cause of this reactor trip was a failed EHC supply line due to excessive vibration induced from an oscillating governor valve. The apparent cause of the oscillating governor valve was a loose lead in the control circuit. It was not possible to determine the cause of the loose lead, but it is believed that it may have occurred during the governor valve replacement performed during the last refueling outage on Unit 1.

The EHC is field run non-class piping. During construction apparently the wrong type of piping was installed in portions of the EHC system. This type of error is much more likely in this category of piping than class piping (i.e., safety-related) which has the attendant design, procurement and installation quality verifications associated with it.

No definitive conclusions could be reached concerning the use of the wrong type of supports in the EHC piping. It was noted that the incorrect supports were located in the support position closest to each valve. It is postulated that at the time of construction it was too difficult to install the grommets thus the field constructors opted for a more readily installed support that met the limited space requirements around the valve.

ANALYSIS OF EVENT:

An unplanned reactor trip is reportable pursuant to 10CFR50.73(A)(2)(iv). The reactor tripped as required and plant equipment operated as expected.

There were no adverse radiological or safety consequences as a result of this event.

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CORRECTIVE ACTION:

The following corrective actions are being taken as a result of this event:

- 1) The loose connection on GV-1 was repaired. The other governor valves on Unit 1 were inspected and the connections were found to be adequate.
2. The EHC supports have been replaced with supports that are identical in function with those specified by Westinghouse.
3. EHC piping that did not meet the specified wall thickness requirements have been replaced on Unit 1. The Unit 2 EHC piping was inspected ultrasonically and it was determined that it met the specified wall thickness requirements.
4. A maintenance bulletin will be issued by August 15, 1990 that uses this event to reinforce the need to ensure that leads are tightened appropriately.
5. The pressurizer pressure controller that was apparently demonstrating a sluggish response during this event was evaluated and was found to be operating properly.

ADDITIONAL INFORMATION:

STPEGS has previously experienced two reactor trips associated with the EHC however, the causes were slightly different. On January 3, 1989 Unit 1 experienced a reactor trip due to a failure in the EHC which caused the throttle valves to close. The cause of this failure was attributed to a poorly crimped lug on a vendor supplied circuit card. This event was reported in LER 89-01.

On April 14, 1990 Unit 2 experienced a reactor trip due to a loss of EHC fluid caused by a weld failure which was caused by governor valve induced vibration. The cause of the governor valve vibration was determined to be valve plug rotation. This event was reported in LER 90-005.

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The Light
company South Texas Project Electric Generating Station
Houston Lighting & Power P. O. Box 289 Wadsworth, Texas 77483

July 30, 1990

ST-HL-AE-3518
File No.: G26
10CFR50.73

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

South Texas Project Electric Generating Station
Unit 1
Docket No. STN 50-498
Licensee Event Report 90-015
Regarding a Reactor Trip on June 28, 1990

Pursuant to 10CFR50.73, Houston Lighting & Power Company (HL&P)
submits the attached Licensee Event Report (LER 90-015) regarding a
reactor trip on June 28, 1990. This event had no adverse impact on the
health and safety of the public.

If you should have any questions on this matter, please contact
Mr. S. M. Head at (512) 972-7136 or myself at (512) 972-7921.

G. E. Vaughn
Vice President
Nuclear Generation

SMH/nl

Attachment: LER 90-015 (South Texas, Unit 1)

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A Subsidiary of Houston Industries Incorporated

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Houston Lighting & Power Company File No.:G26
South Texas Project Electric Generating Station Page 2

cc:

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Revised 12/15/89

L4/NRC/

*** END OF DOCUMENT ***
